

# Comparing the effectiveness of polyethylene covers (Gladwrap<sup>TM</sup>) with lanolin (Duratears<sup>®</sup>) eye ointment to prevent corneal abrasions in critically ill patients: A randomized controlled study

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## Abstract

**Background:** In unconscious ventilated patients, various eye protective measures have been used to prevent corneal abrasions. Two randomized controlled studies in Australia had compared the effectiveness of polyethylene films and eye instillations to prevent corneal abrasions but results were inconsistent. The local acceptance of polyethylene films as a standard eye protective measure is still limited.

**Objectives:** Our study aims to compare the effectiveness of polyethylene covers (Gladwrap<sup>TM</sup>) with lanolin (Duratears<sup>®</sup>) eye ointment in the prevention of corneal abrasions in critically ill patients.

**Design:** A prospective randomized controlled study was conducted between April 2004 and December 2005.

**Setting and participants:** One hundred and twenty ventilated patients admitted to the intensive care unit (ICU) were randomly assigned to receive either polyethylene covers or lanolin eye ointment to prevent corneal abrasions.

**Methods:** All participants received a standard eye care regime together with the eye protective interventions. A fluorescein stain test was performed by the eye care team daily and then weekly to detect any corneal abrasions.

**Results:** Four participants were not included in the data analysis as they died soon after commencement of the study. A total of 116 patients were included in the final analysis. Of the seven patients (6.0%) that had a positive fluorescein test, four (6.8%) were in the polyethylene covers group ( $n = 59$ ) and three (5.3%) were in the lanolin eye ointment group ( $n = 57$ ). This was not statistically significant ( $p = 0.519$ ). One patient in the lanolin eye ointment group had an eye infection. Upon follow-up of those patients with positive fluorescein test results, two patients spontaneously converted to stain negative within 24 h and two patients died before the ophthalmologist's assessment. The remaining three patients were diagnosed to have epithelial cell loss without corneal abrasions.

**Conclusions:** With the implementation of a standardized eye care protocol, polyethylene cover is found to be equally effective in preventing corneal abrasions when compared with lanolin eye ointment. The additional benefit of polyethylene cover as a physical barrier to protect patients' eyes needed further evaluation.

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**Keywords:** Corneal abrasions; Critically ill patients; Eye care; Randomized controlled study

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### What is already known about the topic?

- A variety of eye protection protocols are used to prevent corneal abrasions in critically ill patients but evaluation of their effectiveness is limited.
- Only two randomized controlled studies were conducted to compare the efficacy of polyethylene cover with eye instillations in the prevention of corneal abrasions in critically ill patients and the results were inconsistent.
- One systemic review by Joyce (2001) for The Joanna Briggs Institute suggested superiority of polyethylene cover, especially in burns patients.

### What this paper adds

- The study suggests that polyethylene cover offers similar protection compared with lanolin eye ointment (Dura-tears<sup>®</sup>) in the prevention of corneal abrasions.

## 1. Introduction

Unconscious intensive care unit (ICU) patients who are sedated and paralyzed will have inhibited eye protective mechanisms, subjecting them to increased risk of eye complications. Therefore, eye care is an important part of nursing care in ventilated patients. Various eye care protocols are used and the range of practice varies widely. In one systemic review by Joyce (2001), it was suggested that polyethylene covers were more effective in reducing corneal abrasions when compared with eye drops or eye ointment.

### 1.1. Background

In a healthy person, eyelids offer both physical and mechanical barriers to the eye against trauma and desiccation (Parkin and Cook, 2000). The blink reflex aids in flushing out microorganisms and spreads tears to lubricate the ocular surface. However, these physiological eye protective mechanisms are inhibited in unconscious and heavily sedated patients and result in incomplete eyelid closure (lagophthalmos), decreased tear production and absent blinking reflex. Intermittent positive pressure ventilation encourages venous stasis and fluid retention, resulting in conjunctival chemosis (edema) and subconjunctival hemorrhage. Exposure of the cornea leads to superficial keratopathy, corneal abrasions, keratitis; and in severe cases, ulceration, perforation, scarring and even permanent visual damage (Cunningham and Gould, 1989; Mercieca et al., 1999).

Occurrence of exposure keratopathy or corneal abrasions in ICU patients without any preventive measures can range from 40% (Hernandez and Mannis, 1997) to 60% (Imanaka et al., 1997; Ezra et al., 2005). This incidence of eye complications would be reduced to 26% and 3.3%, respectively after the use of methylcellulose lubricating drops or polyethylene cover (Cortese et al., 1995).

In the systemic review by Joyce (2001), eye care interventions were broadly classified into four categories: eye hygiene regimes, prevention of dry eyes, eyelid closure and a program of eye care. Various products and methods such as eye drops, eye ointments, polyethylene films, passive eye closure, tapes, gels, pads and even temporary tarsorrhaphy (suturing of eyelids) have been used to maintain the integrity of the ocular surface. Most of the time, the nurses' selection of a particular eye care method was largely based on individual belief or institutional policy (Laight, 1995; Farrell and Wray, 1993). However, the effectiveness of these eye care methods has not been thoroughly evaluated.

Cortese et al. (1995) conducted the first randomized controlled trial in 60 comatose patients. This study compared instillation of methylcellulose (Methopt Forte) drops every 2 hourly with a moisture chamber created by a polyethylene film. Only one out of 30 patients in the polyethylene group had positive fluorescein stain and this compared favorably with eight patients in the eye drops group ( $p < 0.05$ ). However, a similar study by Koroloff et al. (2004) did not show that the use of polyethylene film was statistically superior. In this study, a larger group of 110 mechanically ventilated patients with reduced blinking response were recruited. Hypromellose and Lacri-Lube combination (HL) applied every 2 hourly to the patients' eyes was compared with polyethylene/Cling<sup>TM</sup> wrap. Four patients in the HL group developed corneal ulcerations compared to none in the polyethylene group. However, the results did not reach statistical significance. A meta-analysis (Joyce, 2001) combining data from these two studies did demonstrate a statistical significant result in favor of polyethylene films ( $p = 0.002$ , OR 6.22, 95% CI 1.97–19.63).

Lenart and Garrity (2000) compared artificial eye ointment with passive closure of eyelids in 25 sedated and paralyzed mechanically ventilated patients. In each patient, one eye received the lubrication ointment every 4 hourly and the other eye served as a control. Nine patients had exposure keratitis in the untreated eye and two in the treatment group. The study found that use of an ocular lubricant was significantly more effective at preventing corneal abrasions than the passive closure of patients' eyelids by nurses. These favorable results were also noted in a recent study by Ezra et al. (2005). This study compared the effectiveness of three types of eye care measures; namely simple eye toilet, ocular lubricant Lacrilube alone or Geliperma alone. Geliperma is a gel made from polyacrylamide and was originally designed for wound dressing. The incidence of exposure keratopathy in simple eye toilet group, Lacrilube and Geliperma group were 54%, 15% and 90%, respectively. Training and standardization of eye care practice also contributed to the reduction in the incidence of corneal abrasions. By using an eye care algorithm in the study by Suresh et al. (2000), the prevalence of ocular surface abnormalities was reduced to 8.7%.

A recent study by Sivasankar et al. (2006) demonstrated the importance of creating a moist and closed chamber with

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